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(56) Documents Cited
EP 1078801 A JP 2001080365 A
US 5918421 A

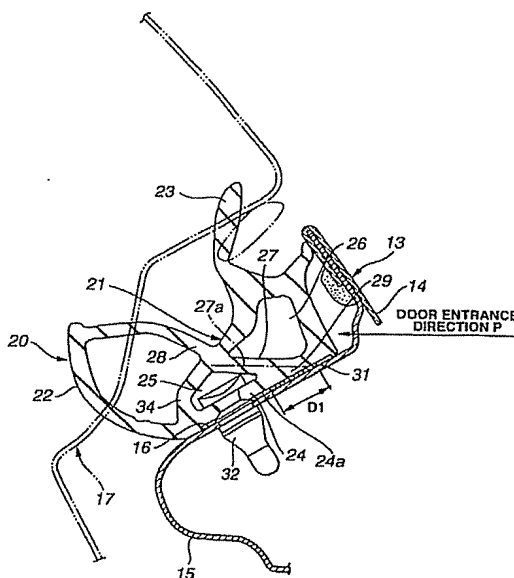
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(54) Abstract Title
Vehicle door weather strip

(57) A weather strip 20 sealing between the door 13, 14, 15 and body 17 of a vehicle comprises a base portion 21, a hollow seal portion 22 and a bridge portion 27, the base portion comprises a wall portion 29 adhered with double-sided adhesive tape 31 to the door frame 16 and a hollow wall portion 34, the hollow seal portion extends from the hollow wall portion, the bridge portion attaches the hollow wall portion and wall portion and is near the connection portion 28 between the hollow seal portion and the base portion. The double sided tape preferably extends only over a distance D1 covering the base of the bridge portion. The bridge portion may be tapered in shape, the angle line 27a makes with the vehicle door entrance may be varied and clip members 32 may be used. A mounting structure for this door weather strip is also disclosed.

FIG.2



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FIG.1

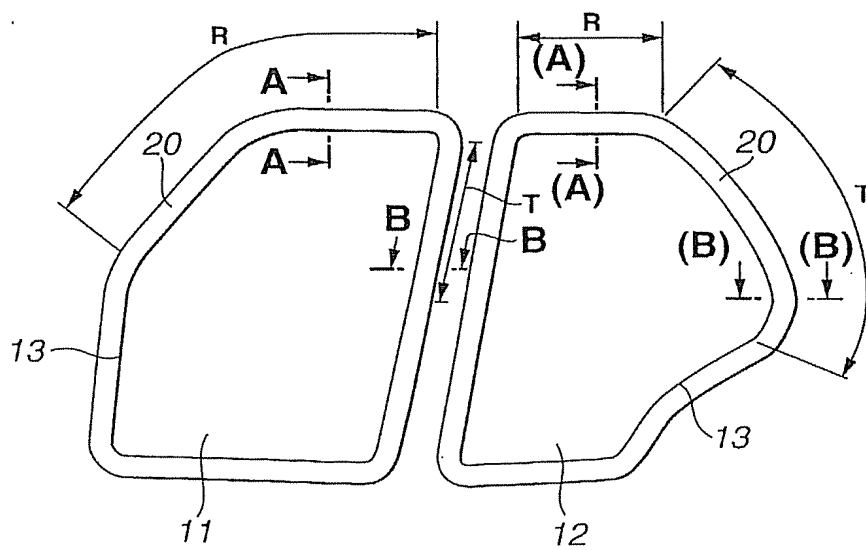


FIG.2

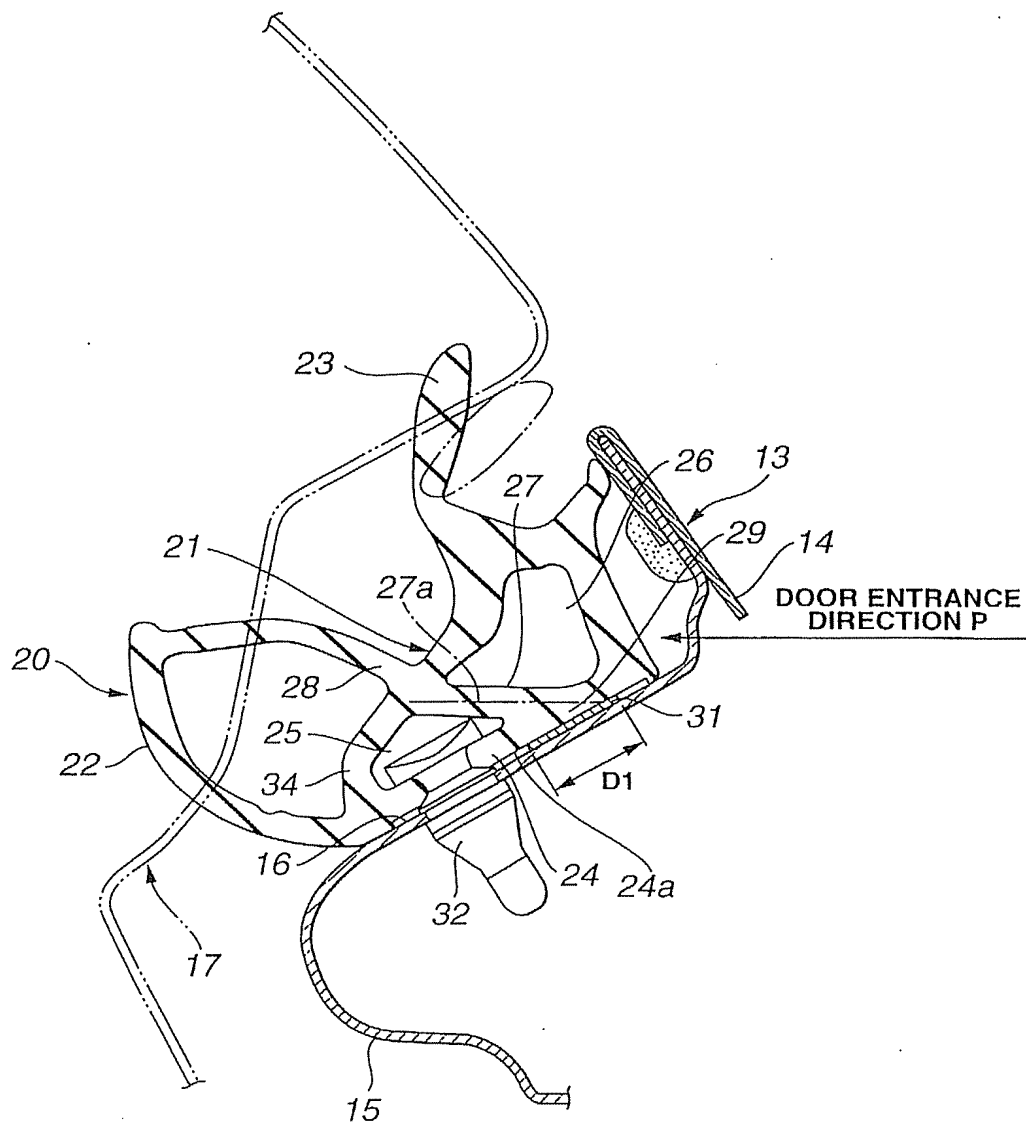


FIG.3

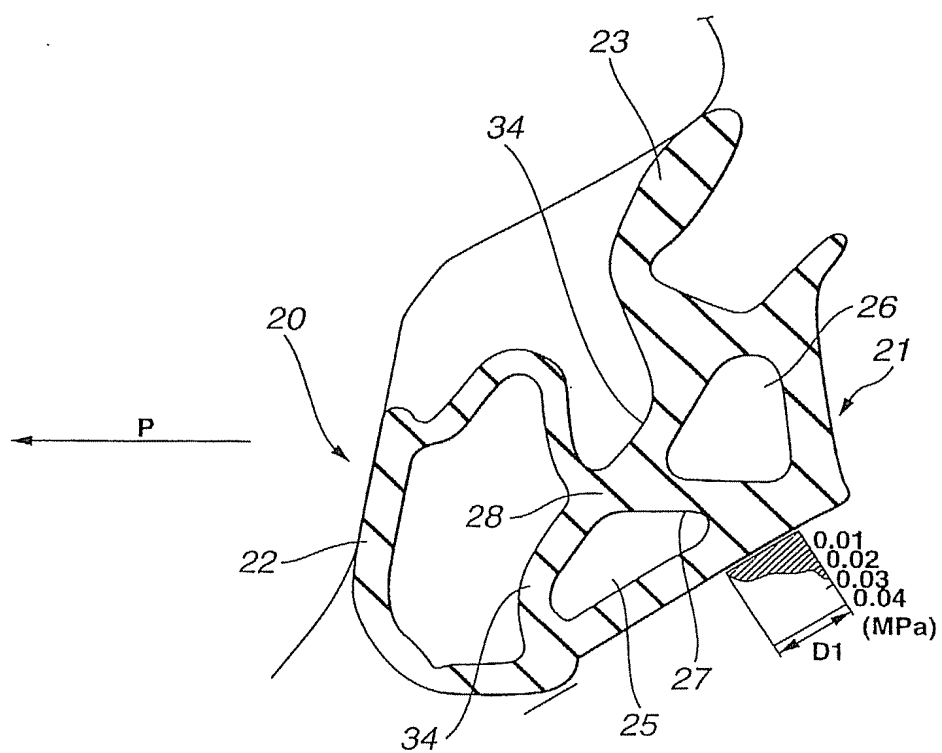


FIG. 4

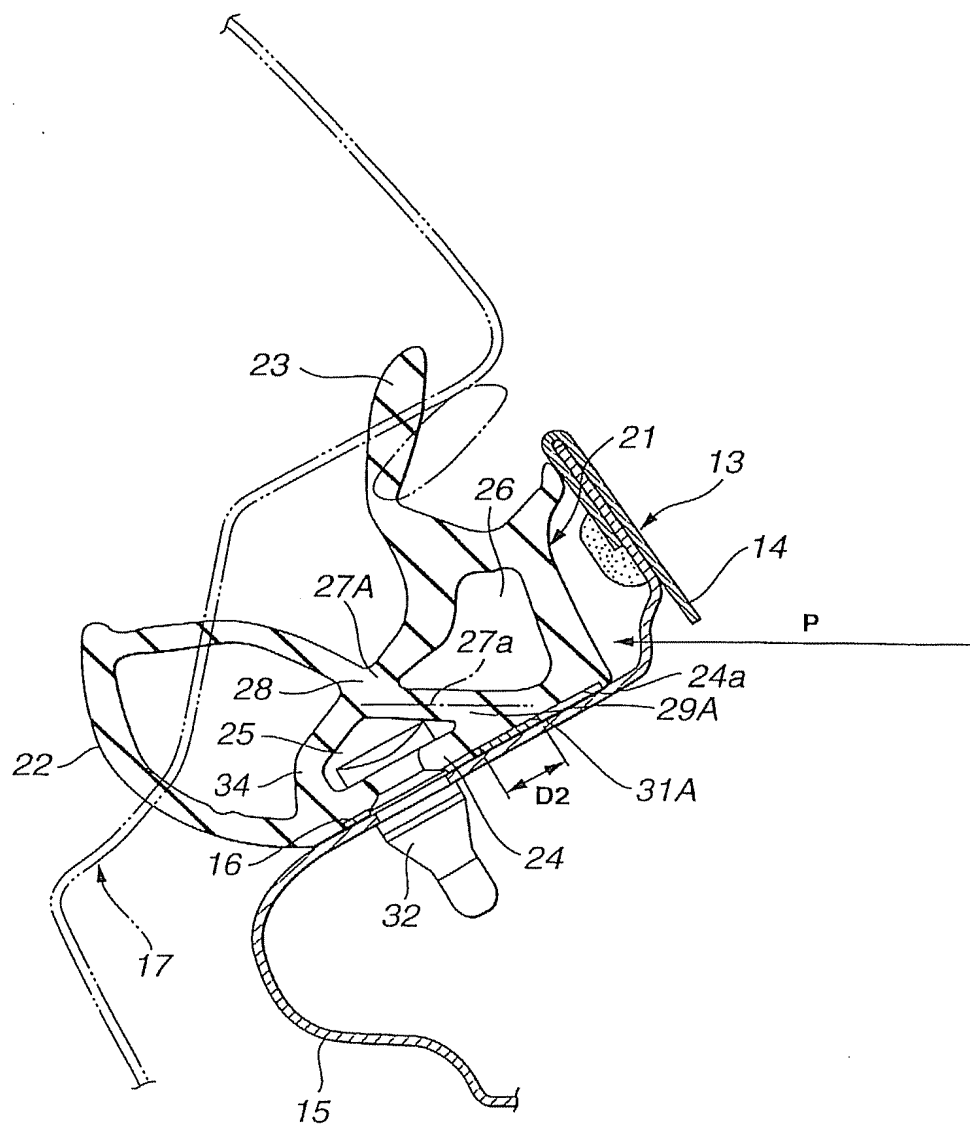


FIG.5

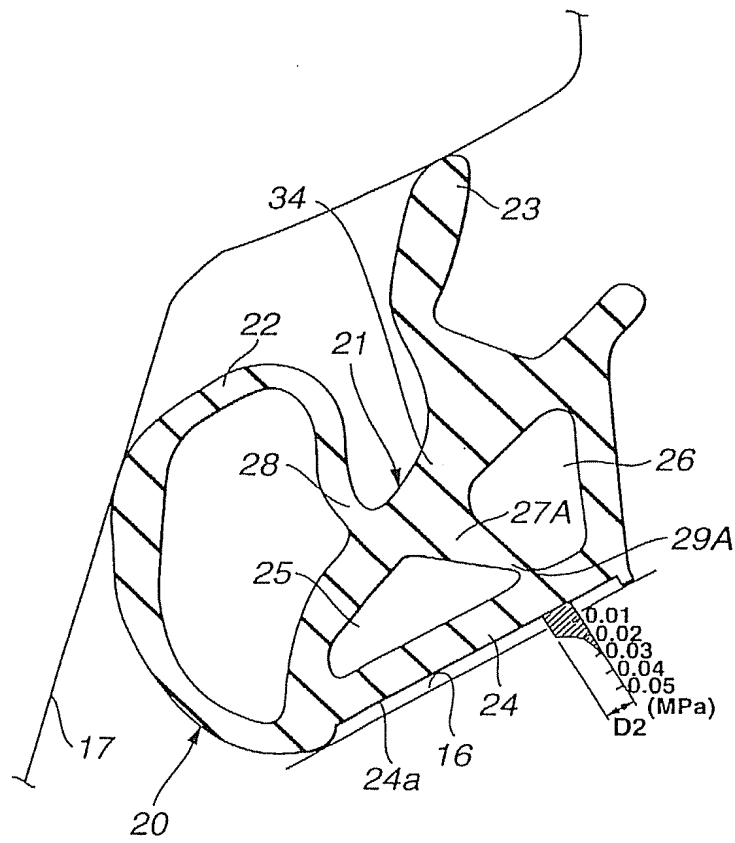


FIG. 6

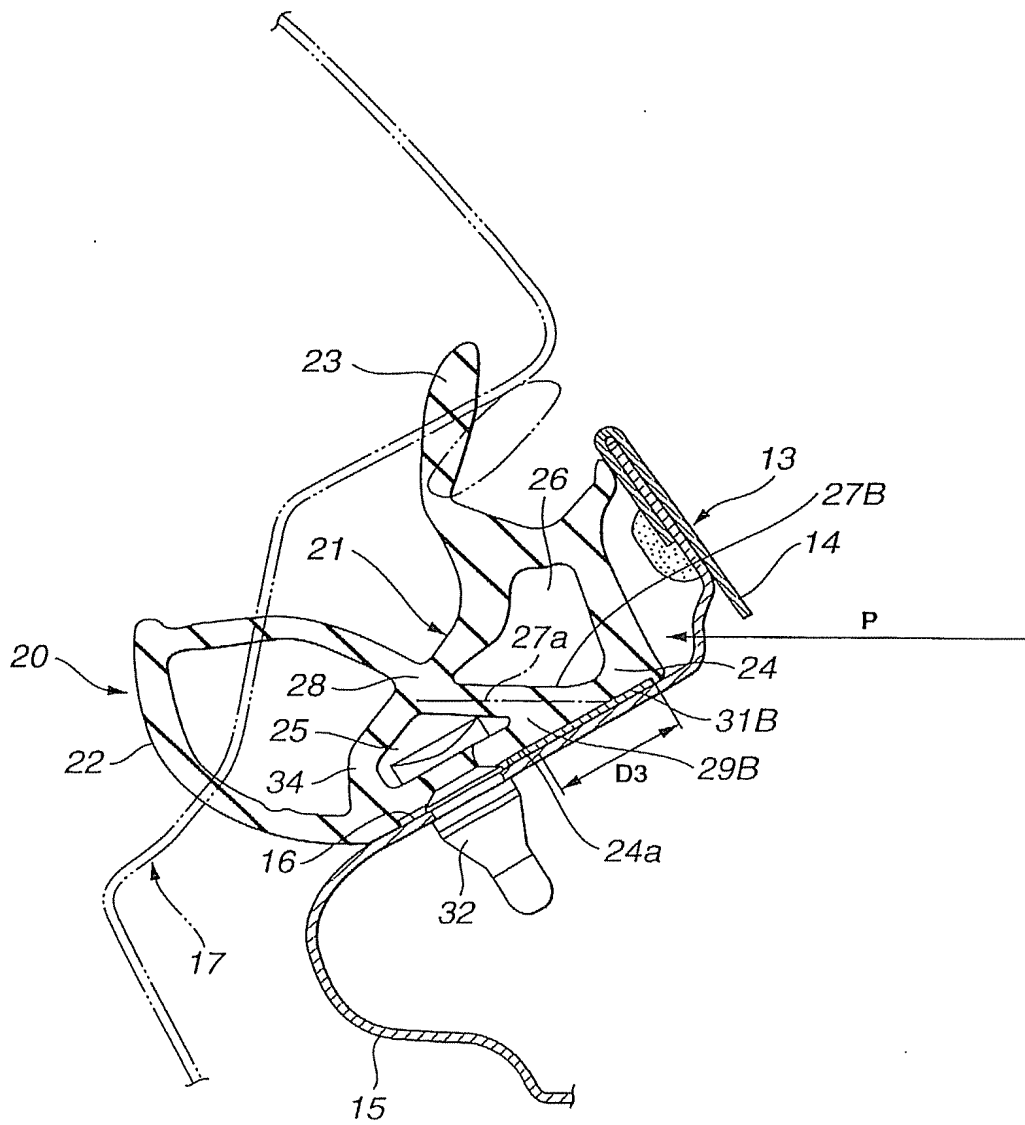


FIG.7

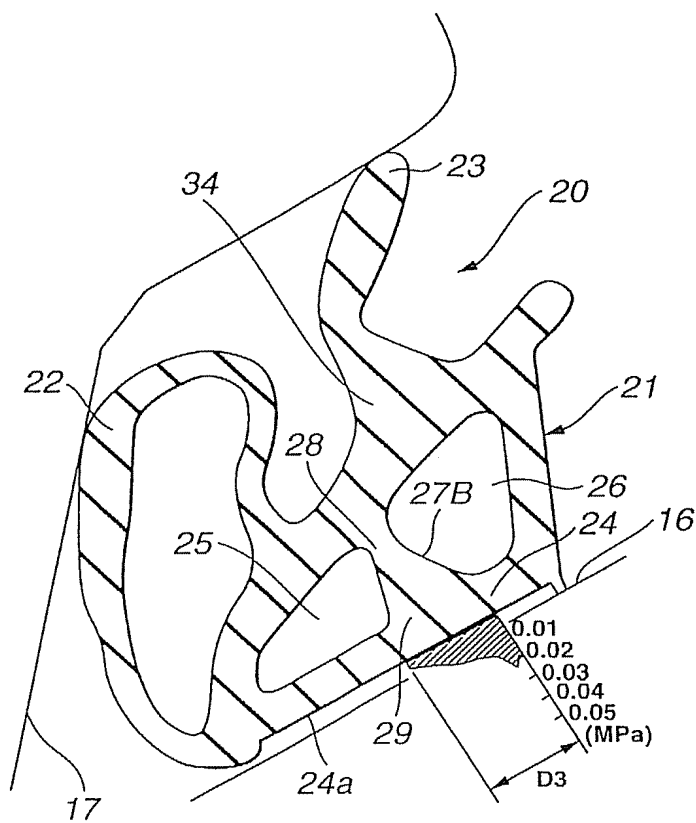


FIG.8

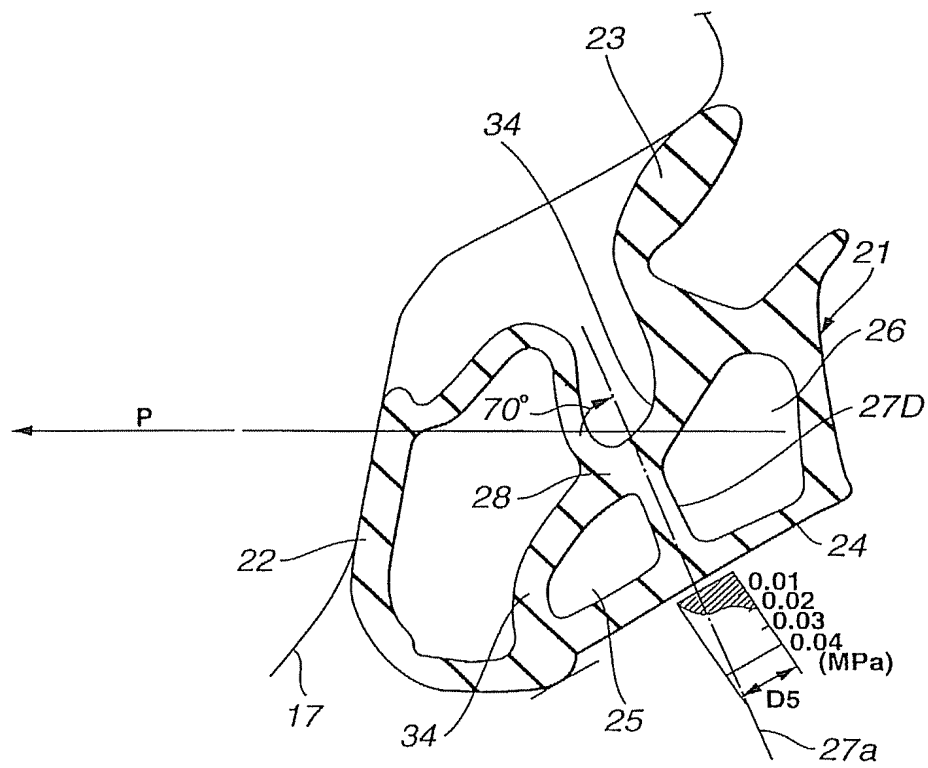


FIG. 9

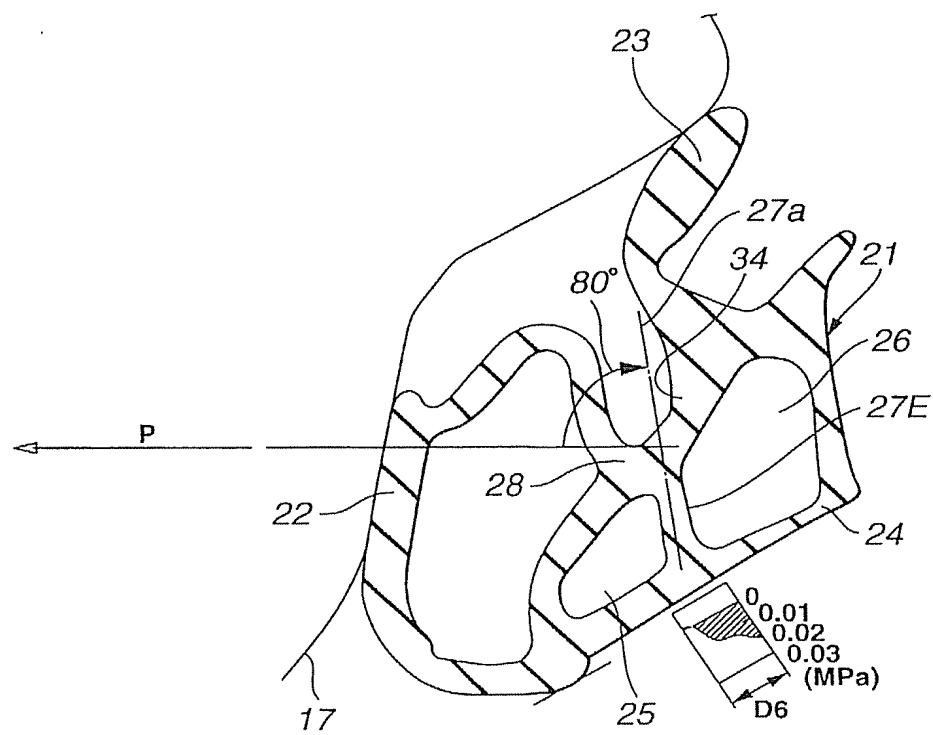


FIG.10

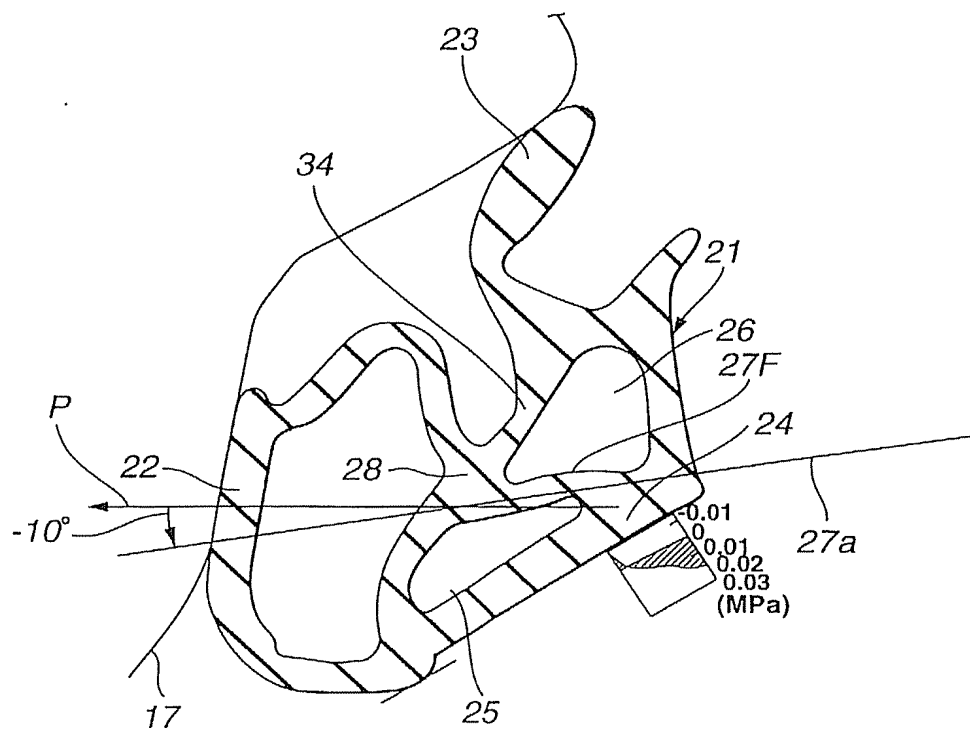
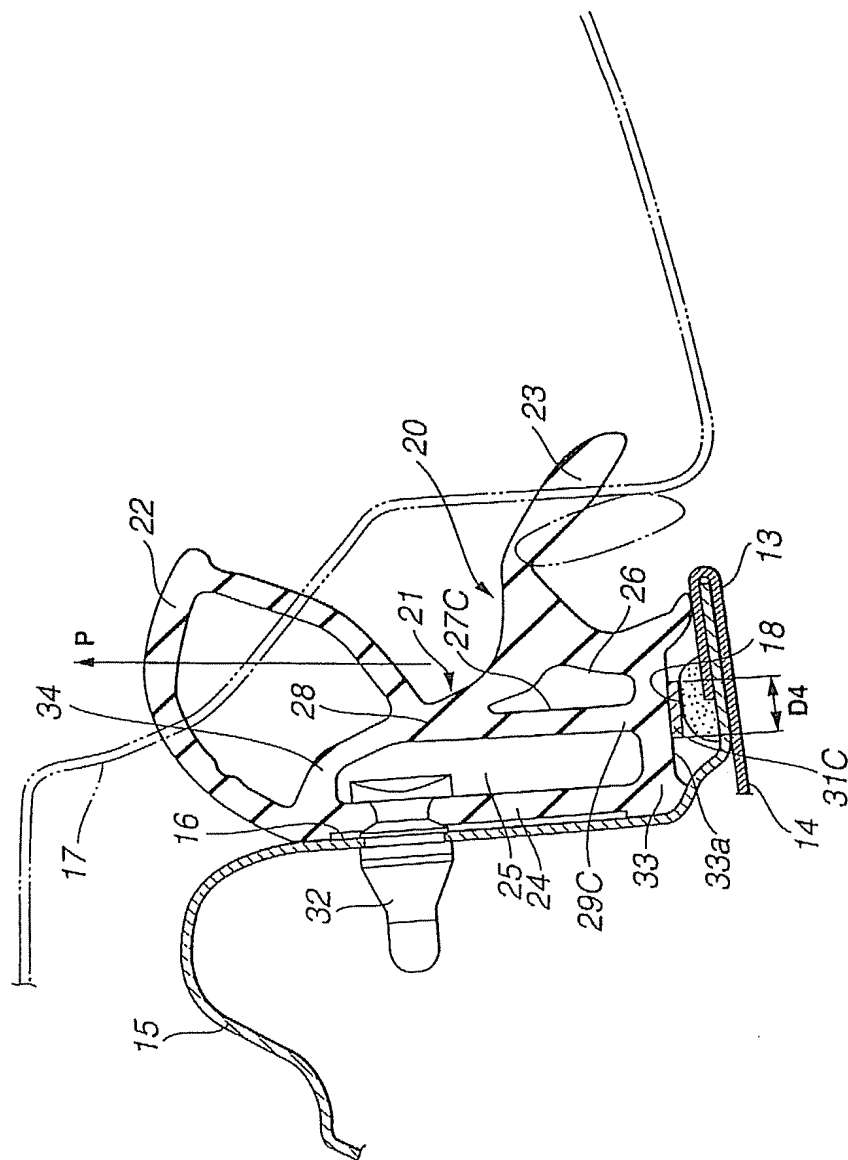


FIG.11



VEHICULAR DOOR WEATHER STRIP AND ITS MOUNTING
STRUCTURE

5

[0001] The present invention relates to a door weather strip and a structure of mounting a door weather strip onto a peripheral portion of a door frame of a vehicular door.

10 [0002] Japanese Patent Application First Publication No. Heisei 9-123760 published on May 13, 1997 (which corresponds to United States Patent No. 5,918,421 issued on July 6, 1999) exemplifies a previously proposed door weather strip mounting structure for an automotive
15 vehicular door. The previously proposed door weather strip teaches a technique of attaching the door weather strip along a door outer peripheral edge portion of an automotive vehicular door in which a retainer is omitted, for a simplification purpose and for a reduction in cost of
20 attaching the door weather strip onto the door outer peripheral edge portion, and a two-sided adhesive tape of a relatively narrow width and clips are used.

[0003] In detail, in the previously proposed door weather strip mounting structure, the door weather strip
25 includes a hollow base portion attached onto the door outer peripheral edge portion and a hollow seal portion integrally projected from the hollow base portion and brought in close contact with a door opening edge portion of a vehicle body. Then, a vehicle body side bottom wall portion (attached
30 wall portion) of the base portion is fixed by means of clips (clip members) and an outer vehicle body side bottom wall portion of the base portion is adhered onto the attached surface of the door outer peripheral edge portion by means

of a two-sided adhesive tape.

[0004] However, in such a previously proposed door weather strip mounting structure as described above, a positive pressure is not favorably acted upon an adhered portion of a two-sided adhesive tape (a pressure directed from the bottom wall portion of the door weather strip edge portion). The two-sided adhesive tape may be peeled off and a further improvement in the door weather strip is demanded.

[0005] Consequently, there is a high possibility that the two-sided adhesive tape is peeled off so that it becomes very difficult to maintain a seal performance at an initial stage of usage for a long term. In order to prevent such a peeling phenomenon as described above, the number of clips is increased so that the increases in the number of parts and in manufacturing cost are brought out. Specially, when, in the mounting structure having the bridge portion which specially defines an internal of the hollow base portion into a pair of spatial portions, a negative pressure is acted upon a root portion connecting the bridge portion to the bottom wall portion during a closure of the door. At this time, the tape becomes furthermore easier to be peeled off at a portion in proximity to the root portion.

[0006] It would therefore be desirable to be able to provide improved door weather strip and its mounting structure on a door outer peripheral edge portion of an automotive vehicular door which are capable of attaching stably and accurately the door weather strip onto the door outer peripheral edge by means of a relatively narrow two-sided adhesive tape.

[0007] According to one aspect of the present invention, there is provided a door weather strip disposed between an outer peripheral portion of a door frame and a vehicle

body, comprising: a base portion having an attached wall portion adhered onto the outer peripheral portion of the door frame via a two-sided adhesive tape and a hollow wall portion extended from the attached wall portion to form
5 a hollow wall; a hollow seal portion extended from the hollow wall portion of the base portion to form a hollow seal and brought in close contact with an opening edge portion of a vehicular door of the vehicle body in such a manner that a hollow portion thereof is deformed during a closure of
10 the vehicular door; and a bridge portion extended to bridge the attached wall portion of the base portion to the hollow wall portion thereof and to have the base portion form a pair of spatial portions and wherein a connecting portion between the bridge portion and the hollow wall portion is
15 arranged substantially in a vicinity to another connecting section between the hollow seal portion and the hollow wall portion.

[0008] According to another aspect of the present invention, there is provided a mounting structure of a door
20 weather strip disposed between an outer peripheral portion of a door frame and a vehicle body, comprising: a base portion of the door weather strip having an attached wall portion adhered onto the outer peripheral portion of the door frame via a two-sided adhesive tape and a hollow wall portion
25 extended from the attached wall portion to form a hollow wall; a hollow seal portion of the door weather strip extended from the hollow wall portion of the base portion to form a hollow seal and brought in close contact with an opening edge portion of a vehicular door of the vehicle
30 body in such a manner that a hollow portion thereof is deformed during a closure of the vehicular door; and a bridge portion of the door weather strip extended to bridge the attached wall portion of the base portion to the hollow

wall portion thereof and to have the base portion form a pair of spatial portions and wherein a connection portion of the door weather strip between the bridge portion and the hollow wall portion is located at the substantially same position as that between the hollow seal portion and the hollow wall portion to enable a receipt of a positive pressure from the hollow seal portion on the attached wall portion via the bridge portion during the closure of the vehicular door.

10 [0009] This summary of the invention does not necessarily describe all necessary features so that the invention may also be a sub-combination of these described features.

BRIEF DESCRIPTION OF THE DRAWINGS:

15 [0010] Fig. 1 is a diagrammatical view of automotive vehicular door onto which a door weather strip according to the present invention is attachable.

[0011] Fig. 2 is a cross-sectional view of a mounting structure of the door weather strip according to the present invention, in a first preferred embodiment, cut away along a line of A - A in Fig. 1.

20 [0012] Fig. 3 is an explanatory view of a pressure acted upon an attachment surface of a door weather strip shown in Fig. 2.

[0013] Fig. 4 is a cross-sectional view of the mounting structure of the door weather strip according to the present invention, in a second preferred embodiment, cut away along the line of A - A in Fig. 1.

30 [0014] Fig. 5 is an explanatory view representing a pressure acted upon an attached surface of the door weather strip shown in Fig. 4.

[0015] Fig. 6 is a cross-sectional view of the mounting structure of the door weather strip according to the present

invention, in a third preferred embodiment

[0016] Fig. 7 is an explanatory view representing a pressure acted upon the attached surface of the door weather strip shown in Fig. 6.

5 [0017] Fig. 8 is a cross-sectional view of the mounting structure of the door weather strip cut away along the line of A - A, in a fourth preferred embodiment according to the present invention.

[0018] Fig. 9 is a cross-sectional view of the mounting
10 structure of the door weather strip cut away along the line of A - A, in a fifth preferred embodiment according to the present invention.

[0019] Fig. 10 is a cross sectional view of the mounting structure of the door weather strip, in a sixth preferred
15 embodiment according to the present invention, cut away along the line of A - A shown in Fig. 1.

[0020] Fig. 11 is a cross-sectional view of the mounting structure of the door weather strip, in a seventh preferred embodiment according to the present invention, cut away along
20 a line of B - B shown in Fig. 1.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0021] Reference will hereinafter be made to the drawings in order to facilitate a better understanding of the present invention.

25 [0022] Fig. 1 shows a common structure applicable to each embodiment of a door weather strip mounting structure as will be described later. That is to say, as diagrammatically shown in Fig. 1, each door weather strip
20 is attached along a door outer peripheral edge portion of an automotive vehicular front door 11 and automotive
30 vehicular rear door 12. Respective portions of each door weather strip 20 are formed integrally together and are made of an elastic material such as a rubber. For example,

a portion of an extrusion in a generally uniform cross-sectional form as shown in each of Figs. 2 through 10 extended along a portion R of a roof portion and a portion of a longitudinal side portion extruded in a substantial uniform shape as shown in Fig. 11 along a longitudinal side portion (a center pillar portion and a rear pillar portion) T as shown in Fig. 11 are manufactured by connecting the corner portion together by means of a metal molding. Figs. 2 through 10 corresponds to cross-sectional views taken along a line of A - A line of Fig. 1. It is noted that Fig. 11 corresponds to a cross-sectional view taken along a line B - B of Fig. 1.

[0023] The mounting structure of door weather strip 20 in a first preferred embodiment which is extended along a roof portion R of door weather strip 20 will be described with reference to Figs. 2 and 3. A door outer peripheral edge portion 13 onto which door weather strip 20 is attached has a structure in which a door outer panel 14 and a door inner panel 15 are joined mutually with a flange portion. A flat mounting plane 16 is bent and formed on door inner panel 15 of the door outer peripheral edge portion 13.

[0024] Door weather strip 20 has a hollow base portion 21 attached onto door outer peripheral edge portion 13. The hollow base portion 13 includes a bottom wall portion (an attached or attached wall portion) 24 in a thin plate form having a flat attached surface 24a adhered onto an attachment surface 16 of door outer peripheral edge portion 13 and a hollow wall portion 34 extended in a hollow shape from the bottom wall portion 24. The two-sided adhesive tape 31 has its one surface adhered onto attached surface 24a and its other surface adhered onto attachment surface 16 of door outer peripheral edge portion 13. This two-sided adhesive tape 31 is previously adhered onto attached surface

24a of door weather strip 20 before it is attached onto the vehicle body with a peeling enabled paper adhered onto the other surface. In addition, door weather strip 20 includes a hollow seal portion 22 projected in the hollow form from the hollow wall portion 34 and brought in close contact with the door opening edge portion 17 of the vehicle body panel during the closure of the corresponding door and a seal lip 23 brought in contact with door opening edge portion 17 during the closure of the corresponding door.

10 [0025] A columnar bridge portion 27 is integrally installed to form a pair of space portions 25 and 26 in the internal portion of base portion 21. The columnar bridge portion 27 is integrally installed to form a pair of spatial portions 25 and 26 in the internal portion of the base portion

15 21. The columnar bridge portion 27 has the following structure so that the hollow seal portion 22 is approximately supported during the closure of the door. That is to say, a reference center line 27a of bridge portion 27 is set so that an angle of a door outer peripheral direction (in

20 a clockwise direction of Figs. 2 and 3) with respect to the door entrance direction P ranges from 0° to 70° . In this embodiment, this angle is set so as to be approximately parallel (0°) to the entrance direction of the door P. In addition, the bridge portion 17 is formed of a bar of a

25 generally uniform cross sectional shape. The bridge portion 27 serves to bridge a portion of connecting a wall portion of the hollow lip portion outside the vehicle to a hollow wall portion 34 of the base portion 21 with the above-described bottom wall portion 24. That is to say,

30 the connection portion between the bridge portion 27 and hollow wall portion 34 is arranged in the vicinity to the connection portion 28 between the hollow seal portion 22 and hollow wall portion 34. In other words, the connection

portion 28 between the bridge portion 27 and hollow wall portion 34 is located at the substantially the same position as the connection portion 28 between the hollow seal portion 22 and the hollow wall portion 34.

5 [0026] It is noted that, in this embodiment, in order to position door weather strip 20 before door weather strip 20 is fixed onto attachment surface 16 of door outer peripheral edge portion with two-sided adhesive tape 31, clip 32 is fixed onto attachment surface 16 of door outer
 10 peripheral edge portion 13. A plurality of such clip members as described above are installed intermittently in the elongate direction of door weather strip 20 and their head portions are penetrated through bottom wall portion 24 so as to be housed onto one spatial portion 25. The two-sided
 15 adhesive tape 31 is disposed only in a width direction range D1 which correspond to roof portion 29 connecting bridge portion 27 to bottom wall portion 24. In other words, the width D1 of two-sided adhesive tape 31 is limited to a range intersecting substantially the bridge portion 27 with
 20 bottom wall portion 24.

[0027] As described above, the connection portion between the hollow seal portion 22 and hollow wall portion 34 and the connection portion between the bridge portion 27 and hollow wall portion 34 are mutually approximated (arranged
 25 in the substantially vicinity to each other) and the angle in the door outer peripheral direction formed between the reference center line 27a of the bridge portion 27 and door entrance direction P is set within the range of 0° through 70°, more particularly, to about 0°. A positive strong
 30 pressure is acted upon the attachment surface 16 of the door outer peripheral edge portion 13 via hollow seal portion 22 and bridge portion 27 during the closure of the door. Since the two-sided adhesive tape 31 is installed only on

this width directional range D1, the tape 31 is not peeled off although the tape 31 has only the relatively narrow width. Door weather strip 20 can strongly and stably be fixed on door outer peripheral edge 13 so that the width sound suppressing characteristic and water-tight characteristic can be maintained for a long period of time. In addition, since a sufficient adhesive force is given by two-sided adhesive tape 31, a low cost door weather strip can be achieved.

10 [0028] A main feature of the door weather strip mounting structure which is different from the first embodiment will be described below and its explanation will properly be omitted.

[0029] Figs. 4 and 5 shows an attachment structure of the roof portion R of the door weather strip 20 in the second embodiment.

[0030] In the second embodiment (refer to Figs. 4 and 5), the bridge portions are formed in a triangular form of cross-section such that as the bridge portion 27A becomes nearer to the root portion 29A, the width of the bridge portion becomes thinner in a truncated cone shape. Therefore, the width-directional range D2 corresponding to the root portion 29A becomes narrow so that the width D2 of two-sided adhesive tape 31A disposed within this range becomes shorter than the distance D1 in the case of the first embodiment.

[0031] As described above, since the width of two-sided adhesive tape 31A becomes furthermore shortened, a further reduction in cost can be achieved.

30 [0033] Figs. 8 through 10 shows fourth, fifth, and sixth embodiments of the door weather strip mounting structure formed by the reference center line 27a of the bridge portions 27D, 27E, and 27F with respect to the door entrance direction

P. In the fourth embodiment, shown in Fig. 8, the angle is set to 70° . In the fifth embodiment, shown in Fig. 9, the angle is set to 80° . In the sixth embodiment, the angle is set to -10° .

5 [0034] Graphs shown in Figs. 3, 5, and 7 through 10 represent pressure values acted from the bottom wall portion 24 to the door outer peripheral edge portion 13 during the closure of the door.

[0035] As shown in the graphs, in the first embodiment,
10 the angle in the door outer peripheral direction formed by the reference center line 27a of the bridge portion is set in the range from 0° to 70° . In the width-directional ranges of D1 through D3, and D5, corresponding to the root portion of the bottom wall portion intersecting across the
15 bridge portion, the pressure directed toward the attachment surface 16 of door outer peripheral edge portion 13 usually indicates a positive value and indicates a locally stronger value. Hence, the two-sided adhesive tape can stably adhered to the attachment surface 16. On the other hand, in the
20 fifth and sixth embodiments, the angle in the door outer peripheral direction formed by the reference center line 27a of the bridge portion with respect to the door entrance direction P is set out of the range of 0° to 70° . In this case, a negative pressure is acted upon a part of the
25 width-directional ranges D6 through D7 corresponding to the root portion of the bottom wall portion 24. As compared with each of the first through fourth embodiments, the adhesive stability of the two-sided tape is lowered.

[0036] Fig. 11 shows an attachment structure of the part
30 long the longitudinal side portion T of the door weather strip 20 in a seventh preferred embodiment. The mounting structure in the longitudinal side portion may commonly used to that of the portion extended along the roof portion

R shown in each of the first through sixth embodiments.

[0037] In the longitudinal side portion T, there is a tendency that the positive pressure from the bottom wall portion 24 to the attachment surface 16 of the door outer peripheral edge portion 13 during the door closure is almost not acted upon due to structural restraint as being parallel of the door entrance direction P and the attachment structure 16 during the door closure. On the other hand, a side wall portion 33 (attached wall portion) in a thin plate form which is folded at an approximately right angle from the door entrance direction P is formed through a predetermined angle (about 90°) with respect to the door entrance direction P. There is a tendency of acting the positive pressure on a sub-attachment surface 18 from the side wall portion 33 during the closure of the door. Then, in the longitudinal side portion T, one end of the bridge portion 27C which forms the internal of the base portion 21 into the pair of spatial portions 25 and 26 is connected to the side wall portion 33 and the bridge portion 27C is disposed in substantially parallel to the door entrance direction P. In addition, the two-sided adhesive tape 31C is used to adhere the sub-attachment surface 18 of the door outer peripheral edge portion 13 onto the opposing attached surface 31C of the side wall portion 33 with the two-sided adhesive tape 31C.

[0038] Then, this two-sided adhesive tape 31C is disposed only over the width-direction range D4 which corresponds to the root position 29C connected to the side wall portion 33 of the bridge portion 27C. Consequently, in the same way as in the case of the first through fourth embodiments, the use of the two-sided adhesive tape 31C having the relatively narrow width permits the strong and stable contact of the door weather strip 20 on door outer peripheral

edge 13 so that the stable sealing performance can be maintained for the long period of time.

[0039] It is noted that, in the longitudinal side portion T of the seventh embodiment, a part of the vehicle internal side of the vehicle of the bottom wall portion 24 is fixed on the attachment surface 16 of door outer peripheral edge portion 13 by means of clips 32.

[0040] The entire contents of Japanese Patent Applications No. 2001-117562 (filed in Japan on April 17, 2001) and No. 2001-307065 (filed in Japan on October 3, 2001) are herein incorporated by reference. The scope of the invention is defined with reference to the following claims.

CLAIMS

1. A door weather strip disposed between an outer peripheral portion of a door frame and a vehicle body, comprising:

5 a base portion having an attached wall portion adhered onto the outer peripheral portion of the door frame via a two-sided adhesive tape and a hollow wall portion extended from the attached wall portion to form a hollow wall;

10 a hollow seal portion extended from the hollow wall portion of the base portion to form a hollow seal and brought in close contact with an opening edge portion of a vehicular door of the vehicle body in such a manner that a hollow portion thereof is deformed during closure of the vehicular door; and

15 a bridge portion extended to bridge the attached wall portion of the base portion to the hollow wall portion thereof and to have the base portion form a pair of spatial portions and wherein a connecting portion between the bridge portion and the hollow wall portion is arranged
20 substantially in a vicinity to another connecting section between the hollow seal portion and the hollow wall portion.

2. A door weather strip disposed between an outer peripheral portion of a door frame and a vehicle body as claimed in claim 1, wherein the two-sided adhesive tape
25 is extended only along a range in a width direction corresponding to a root portion at which the bridge portion is connected to the attached wall portion.

3. A door weather strip disposed between an outer peripheral portion of a door frame and a vehicle body as

claimed in claim 2, wherein the bridge portion is formed in a tapering shape of cross-section as the bridge portion becomes closer to the root portion.

4. A door weather strip disposed between an outer peripheral portion of a door frame and a vehicle body as claimed in claim 2, wherein the bridge portion is formed in an inverse of a tapering shape of cross-section as the bridge portion becomes closer to the root portion.

5. A door weather strip disposed between an outer peripheral portion of a door frame and a vehicle body as claimed in any one of the preceding claims 1 through 4, wherein an angle in a door outer peripheral direction formed between a vehicular door entrance direction and a reference center line of the bridge portion is set to fall in a range from 0° to 70° .

6. A door weather strip disposed between an outer peripheral portion of a door frame and a vehicle body as claimed in claim 5, wherein the angle is set to be about 0° .

7. A door weather strip disposed between an outer peripheral portion of a door frame and a vehicle body as claimed in claim 5, further comprising clip members disposed at and spaced at intervals along one of the pair of spatial portions of the base portion for temporarily fixing the clip members to the vehicle door, each of the clip members comprising a head portion mounted within the hollow wall portion.

8. A door weather strip disposed between an outer

peripheral portion of a door frame and a vehicle body as claimed in claim 6, wherein the angle is set to be substantially 70° .

5 9. A door weather strip disposed between an outer peripheral portion of a door frame and a vehicle body as claimed in claim 1, wherein an angle in a door outer peripheral direction formed between a vehicular door entrance direction and a reference center line of the bridge
10 portion is set to be about 80° .

10. A door weather strip disposed between an outer peripheral portion of a door frame and a vehicle body as claimed in claim 1, wherein an angle in a door outer
15 peripheral direction formed between a vehicular door entrance direction and a reference center line of the bridge portion is set to be about -10° .

11. A mounting structure of a door weather strip
20 disposed between an outer peripheral portion of a door frame and a vehicle body, comprising:

a base portion of the door weather strip having an attached wall portion adhered onto the outer peripheral portion of the door frame via a two-sided adhesive tape
25 and a hollow wall portion extended from the attached wall portion to form a hollow wall;

a hollow seal portion of the door weather strip extended from the hollow wall portion of the base portion to form a hollow seal and brought in close contact with
30 an opening edge portion of a vehicular door of the vehicle body in such a manner that a hollow portion thereof is deformed during closure of the vehicular door; and

a bridge portion of the door weather strip extended

to bridge the attached wall portion of the base portion to the hollow wall portion thereof and to have the base portion form a pair of spatial portions and wherein a connection portion of the door weather strip between the bridge portion and the hollow wall portion is located at the substantially same position as that between the hollow seal portion and the hollow wall portion to enable receipt of a positive pressure from the hollow seal portion on the attached wall portion via the bridge portion during the closure of the vehicular door.

12. A mounting structure of a door weather strip disposed between an outer peripheral portion of a door frame and a vehicle body as claimed in claim 11, wherein the two-sided adhesive tape is extended only along a range in a width direction corresponding to a root portion of the door weather strip at which the bridge portion is connected to the attached wall portion.

13. A mounting structure of a door weather strip disposed between an outer peripheral portion of a door frame and a vehicle body as claimed in claim 12, wherein the bridge portion is formed in a tapering shape of cross-section as the bridge portion becomes closer to the root portion.

14. A mounting structure of a door weather strip disposed between an outer peripheral portion of a door frame and a vehicle body as claimed in claim 12, wherein the bridge portion is formed in a spreading out structure of cross-section as the bridge portion becomes closer to the root portion.

15. A mounting structure of a door weather strip

disposed between an outer peripheral portion of a door frame and a vehicle body as claimed in any of claims 11 to 14, wherein an angle in a door outer peripheral direction formed between a vehicle door entrance direction and a reference center line of the bridge portion is set to fall in a range from 0° to 70°.

16. A door weather strip substantially as described with reference to, and as shown in, Figure 2, Figure 4, Figure 6, Figure 8, Figure 9, Figure 10, or Figure 11 of the accompanying drawings.

17. A mounting structure substantially as described with reference to, and as shown in, Figure 2, Figure 4, Figure 6, Figure 8, Figure 9, Figure 10, or Figure 11 of the accompanying drawings.



INVESTOR IN PEOPLE

Application No: GB 0208804.5
Claims searched: 1-17

Examiner: Ben James
Date of search: 20 September 2002

Patents Act 1977

Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.T): E1J: JGN

Int Cl (Ed.7): B60J: 10/00, 10/08
E06B: 7/16, 7/22, 7/23

Other: Online: EPODOC, WPI, JAPIO

Documents considered to be relevant:

Category	Identity of document and relevant passage		Relevant to claims
A	EP 1078801 A	NISHIKAWA RUBBER CO LTD (Whole document)	-
X	US 5918421 A	TOYODA GOSEI KK (Figures 1 and 2, adhesive tape 6)	1, 7 & 11
A	JP 2001080365 A	TOYODA GOSEI KK (Figures 2 and 3)	-

X Document indicating lack of novelty or inventive step
Y Document indicating lack of inventive step if combined with one or more other documents of same category.

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A Document indicating technological background and/or state of the art.
P Document published on or after the declared priority date but before the filing date of this invention.
E Patent document published on or after, but with priority date earlier than, the filing date of this application.